

## CHAPTER VIII.

OBSERVATIONS UPON THE TACTICAL IMPORTANCE OF THE  
DIFFERENT ARMS.

OF the different kinds of troops and other formations destined for war, of which the mobilized strength has been given in the above statement, the Infantry, Cavalry, and Artillery are the proper tactical arms, *i.e.* those arms which are destined for action in the field. The important and indispensable share that falls to the lot of the Pioneers, as technical troops in field warfare, has already been mentioned, and it is superfluous to speak of the necessity of the different Trains. Although the specially tactical arms pursue the object which all have in common—that of victory—still the rôle which each individually has to carry out differs in character according to the arm; and, moreover, their tactical importance is not the same.

The main strength of modern armies lies in the Infantry, and so long as the Infantry of an Army remains unshaken, that side retains a prospect of success. The foundation for this truth is not merely to be found in the fact of the Infantry forming a largely preponderating mass of the Army, and consequently in its having to sustain the greatest weight of the combat, but rather in its material efficacy, which has increased in proportion to the high degree of technical perfection which this arm has attained. Another circumstance must be added which concerns the German Infantry especially, namely, its peculiar manner of fighting in company columns, which enables numerous swarms of skirmishers to be developed. As each individual man in the skirmishing

system of fighting possesses more freedom of action than he could have in closed ranks, so it is especially the Infantry who bring into play the intelligence, existing even among the private soldiers in our Army.

As regards the increased efficacy from the improvement in firearms, it is only the Artillery which has progressed with the Infantry, although not in the same degree ; whilst the Cavalry, whose tactical strength depends chiefly on the horse, which cannot be improved, has remained stationary, and therefore has relatively retrograded. In consequence of the more extended sphere of action of the two other arms, the Cavalry is compelled to keep further back in battle, and its action is still more limited to certain moments and circumstances than in former times. Thus, amongst other causes, the rapid fire of Infantry only admits of a prospect of success to Cavalry attacks, if the Infantry has already been shaken, and its tactical order considerably disturbed.

The Infantry acquires especially great importance by its capability of being employed equally well for attack and for defence ; not only in fire-action, which certainly constitutes its principal strength, but also in fighting at close quarters ; and that by day and, when required, by night ; in all kinds of ground, if generally practicable ; in short, pretty nearly under any circumstances. All the more weight is given to this aptitude for manifold employment by the fact, that the art of war no longer seeks by preference, as in former years, for open plains in the theatre of operations, upon which to dispose the troops in close lines and in the most regular order of battle ; but, on the contrary, instead of avoiding hills and dales, woods and villages, and country intersected by ditches and gulleys, these are intentionally drawn into the scene of action. The company columns of our Infantry, with their swarms of skirmishers, adapt themselves with ease to such intricacies of the ground, owing to their movable and elastic character, and there find themselves quite in their right element.

It may here be remarked in anticipation, that by making use of all the accidents of ground in battle, advantages are obtained, especially for the defence. Villages, farms, etc. afford the defenders strong tenable points. Their troops find covered positions behind the hills, in the ravines and ditches, upon the borders of the woods, etc. That portion which stands and awaits the advance of the foe can use its firearms undisturbed. The attacking side, however, is compelled to expose itself in advancing, and during the movement is unable to fire at all, or can only do so inefficiently. With all this the defence gains a great material advantage, which the introduction of rapid-firing small arms has considerably increased. But, on the other hand, the attack possesses the advantage of concentrating its forces especially upon *one* point of the enemy's position, and can therefore throw itself upon it in superior numbers; and the moral impulse, which is as a rule upon the side which advances, gives the attacking force a complete equivalent for all the material advantages of the defence. Amongst others, the storming of Weissenburg, the Geissberg, the heights of Speichern and of St. Privat, by the Prussians and Bavarians, in the present year, exhibit in how brilliant a manner this factor has been able to overcome the greatest difficulties of ground and the most devastating fire.

To pursue this reflection to a wider field, but one which, however, is not unknown to the reader—the attack in a strategical sense has also the ascendancy in the larger war relations. The plan of a campaign based upon it prescribes in a certain measure the road which the course of the war is to pursue; it lays down the law for its opponent. The latter is hindered from carrying out his own strategical projects; he is compelled to think of averting the attacks directed against him; he is, in other words, no longer completely free master of his actions. Not to await the development of the enemy's measures, but rather to anticipate them by one's own, is called in military language *taking the initiative* (in German, making the commencement). The initiative and the attack, however, are intimately connected.

The genius of all generals of the first order, from the time of Alexander the Great, has been especially of an aggressive nature ; that is to say, they carried on offensive warfare. In the present war the German Army Direction seized the initiative. Immediately profiting by an advantage offered for the offensive, superior forces were directed against one of the enemy's flanks, and the campaign was opened with the victorious battles of Weissenburg and Wörth.

Since the wars of Frederick the Great, the 'attack' which suits the military spirit of Prussian soldiers, and has become the fundamental principle of the Prussian War Direction, has in only one instance been renounced, when Prussia was destined to suffer reverse — in the commencement of this century. Prussia and Germany, then internally divided, were conquered and humbled by the same powerful and haughty foe who, in the present war, has already been overcome by the arms of *united* Germany, under Prussian direction.

So much for the mutual relations of the two fundamental forms of combat, 'attack' and 'defence.'

It has been mentioned above that the Infantry is equally well adapted for either of these forms. The Cavalry, however, is essentially an offensive arm, by which expression it must be understood, that even its defence takes the form of an attack. The tactical strength of Cavalry lies chiefly in the physical force of the charge. For this reason it never receives the foe at the halt, but, on the contrary, always goes forward to oppose him (attacks him).

To term the Artillery a defensive arm, as is sometimes the case, can only be based on the untenable ground that it cannot immediately break through the enemy's ranks like the Infantry and Cavalry. But setting aside this limitation, the crushing power of ordnance is just as serviceable for the attack as for the defence. At the same time the Artillery has one very weak side. It is unable to defend itself, if somewhat unexpectedly attacked by Cavalry, and the smallest body of Infantry which

succeeds in approaching it concealed from view, and fires upon the serving troops and horses, can compel a whole Battery to drive off. Consequently, in order to be secured from such eventualities, the Artillery in most cases requires an escort of the other arms ; it is therefore very dependent, in spite of its great material efficacy.

Battles and fights of the present day are, as already mentioned, chiefly made up of isolated fights round certain objects, namely about woods (the Wood of Swip in the battle near Königgrätz will be remembered) and villages. The latter then especially play an important part, and the final decision is frequently dependent on the possession of one or more villages. Thus Ligny was a great battle, entirely made up of village fighting. Battles of this nature, however, frequently deprive the Cavalry of all opportunity of taking an active part in them. In fights round villages, the Artillery, on the other hand, can participate in the attack by bombarding them ; and at the defence by receiving the enemy with the fire of its batteries in position on the flanks. Only in both these cases—namely, the immediate defence or assault on these places—the chief action always remains the task of the Infantry. The employment of Cavalry in large numbers, in order to bring on a decision by their masses, is besides rendered difficult by the frequent impediments of the ground and by increasing cultivation. This is the reason why the Reserve Cavalry is no longer formed in whole Corps, as in earlier times, but is broken up into smaller bodies (at the most into Divisions).

Although, according to what has been said, the Infantry takes the first place, in regard to its combative rôle, yet this circumstance does not exclude the other arms from taking a very important place in this rôle. How very necessary their support is to the Infantry, and, above all, in what close mutual relations the three arms stand, is proved by the organization of divisional Cavalry and divisional Batteries, as already mentioned. The Artillery, by means of the force of its projectiles, prepares for the decision of battles, and even under certain circumstances *decides*

them. The moment for the employment of Cavalry (with the exception of Regiments allotted to Infantry Divisions) presents itself, it is true, most frequently, in the last stage of the battle only. But then, breaking forth from the Reserve, the complete discomfiture of the already shaken foe, or the pursuit of the beaten enemy, falls to their lot—the harvest after victory—always supposing that circumstances of the ground permit of their appearing in great strength, which indeed is not always the case. The two arms have also sometimes the opportunity of covering the immediate retreat from the field of battle. This took place, for example, in the battle of Königgrätz, on the part of the Austrian Reserve Artillery and Cavalry. The former especially sacrificed itself heroically on that day, to prevent the entire destruction of the conquered army.

It follows from what has been said, that the conformation of battles in the present day is generally unfavourable for the employment of large masses of Cavalry. Experience also shows that, in the late wars, though the Cavalry has gained renown by numerous brilliant feats, yet that the opportunity for a *great deed*, *i.e.* striking a decisive blow on the field of battle, has been denied it. This circumstance has given rise to the opinion, that the effective of this costly arm could be considerably reduced without any disadvantage, and therefore that this ought to be done for the benefit of the Army budget. This would, however, be a bad financial speculation.

In the first place, no one knows whether the scene of a future war may not be on open plains, and therefore with battle-fields suitable for the movements of Cavalry. To mention a case in point, although at some distance of time, we recall the battle of La Belle Alliance, where the heavy attacks of the French Cuirassier Corps, between Hougoumont and La Haie Sainte, were in no way wrecked by obstacles of the ground, but only by the steadfastness of the English line. But then indeed war is not composed solely of battles and fights. It also comprises other and important branches, such as the whole of the security, intelligence,

and partisan services, which two last categories fall especially to the lot of the Cavalry. The new principle which has of late been introduced, on the German side, for the employment of Cavalry must be taken into special consideration, as it opens to this arm a more extended sphere of action in war, and provides it with ample compensation for the disfavour occasioned by its uncertain action (because dependent upon circumstances), when employed as a reserve in battle; which, however, is always likely to remain its destiny.

The Reserve Cavalry stands, according to the order of battle, in the last body of troops; therefore, even in marching to encounter the foe, its place hitherto has for the most part been at the tail, *i.e.* behind the column. In the present war the Prussian Army Direction has so far departed from the practice as to place large Cavalry detachments equally at the head of the columns of march, not merely as reinforcements to the Advanced Guards, but for freer and more independent action. Thus, amongst other instances, immediately after the battles of Weissenburg and Wörth, a strong and independent Division of Cavalry, provided with Horse-artillery, under the command of H.R.H. Prince Albert (father) of Prussia, preceded the victorious 3rd Army in pursuit of the enemy, keeping always some days' march in advance, and consequently a long way in front.

This Cavalry, then, adhering to the heels of the retiring foe, disquieted him without intermission; drove his Cavalry from the field when it occasionally stood in opposition; and covering a large portion of the enemy's territory with its partisan troops, who made inroads in all directions, they secured its resources, especially the means of subsistence, for their own troops; suppressed the military risings of the population, and carried with them into the very heart of France a paralysing terror for German arms. Large Cavalry detachments employed in such a manner have thus become of specially important utility; for, acting as an immense reconnoissance spreading out on all sides, they kept the Army Direction acquainted with the most im-

portant events concerning the enemy ; whilst at the same time the operations of their own Army Divisions, encompassed by a sphere of horsemen, were impenetrable to the enemy's eye ; thus *securing the strategical secret.*

The anonymous pamphlet, either composed or inspired by the prisoner at Wilhelmshöhe, 'Des Causes qui ont amené la Capitulation de Sedan,' which makes interesting disclosures respecting the French side of the war, touches upon this subject. Besides the avowal of the numerous defects from which the French Army organization suffered, it mainly attributes the misfortunes which befel the Army (even quite at the commencement of the war) to the curtain formed by the Cavalry, behind which the German Army Direction knew how to conceal the strength, positions, and marches of the troops ; in short, its plans. The absolute uncertainty in which the French found themselves respecting the measures of the enemy has, according to this publication, mainly contributed to the misfortunes of Marshal Bazaine round and in Metz. Notwithstanding all their researches, they were unable to ascertain with what forces they had to do, or that the whole of the 2nd German Army had crossed the Moselle about the middle of August. Even on the 18th, the day of Gravelotte, it was not doubted that the retreat upon Verdun could be effected without difficulty—a fatal mistake ! To the indefatigable exertions of Prince Albert's Cavalry Division is due the merit of obtaining for the Prussian Head Quarters sufficiently early and correct information with respect to Marshal MacMahon's march to deliver the Army then enclosed in Metz, so that measures could be taken not only to parry the blow, but also to bring about the first great catastrophe of this war—that of Sedan. And later, during the operations of the 3rd Army upon Paris, the fleet, far-extending troops of this Division spreading towards Orleans, procured the first exact information of the important circumstance, that a new hostile Army was in existence—the so-called Loire Army.

All this proves satisfactorily what a prominent part our Cavalry has taken in the extremely fortunate progress of the present war, although without having had the opportunity of appearing in a decisive manner upon any of the battle-fields in the shape of Reserve Cavalry. The German Cavalry, as all the world knows, is far more capable than the French. At the same time its excellent performances would not have been possible—at any rate to the same degree in which they took place—if it had not been so completely superior in numbers to the adversary, that the latter was everywhere obliged to evacuate the field.

The demand for a reduction of our Cavalry will, after the events of this year, be effectually silenced. Its effective, moreover, does not surpass the proportion as a whole, fixed by the exigencies of war, and accepted by other large Armies. Germany must, however, be prepared to have to do with an enemy whose Cavalry is just as strong as her own, and—is better than the French.

In the following slight sketch an attempt will be made to illustrate, in their general features, the peculiar employment of the different arms in the larger actions, and under the two headings—Defence and Attack.

The *Defence* presupposes a position. When there is a certain space, as in most cases, for the choice of it, one should be selected with heights and a free view, favourable for the action of arms, the troops being covered as much as possible. In front of the position, and within reach of their own fire, there should be obstacles of ground which impose difficulties in the way of the enemy's approach ; whilst, at the same time, there must be no impediments to their own retreat, in the event of its becoming necessary. The Austrian position at Königgrätz possessed an obstacle of this kind in the Bistritz swamp, whilst on the other hand the Elbe, in their immediate rear, hindered the retreat of the beaten Army in a disastrous manner. For a good position

it is further desirable that the flanks should be supported by impassable or at least difficult ground.

Mention has already been made of the solid support which positions acquire by the occupation of parcels of wood and villages, etc. The latter, as also previously stated, should be placed in a state for an energetic defence. An artificial strengthening, especially of weak points, will be attained by means of field entrenchments. In the present war, at first on the side of the French, cover trenches (taken from those of the Russians in the siege of Sebastopol) have come into use, in which the riflemen obtain cover which otherwise could not be found. Advanced posts, pushed forward to a suitable distance, give security against surprise on the part of the enemy.

The front line of defence, thus prepared, is occupied by Infantry, with dense swarms of skirmishers and their supports. In the German Army this service falls to the lot of the company columns. Behind this line is the main body (principal position) of the Infantry, usually formed up in two bodies, and for a while in columns, ready to reinforce the front line, and should the enemy nevertheless succeed in overpowering the defenders, to withstand him in line with rifle fire, or in columns with the bayonet.

The Artillery furnishes the entrenchments with heavy guns, or forms up batteries on the points which are favourable for their effect, in order to shell the enemy when at a great distance, to subdue his Artillery, and, above all, to weaken his attack as much as possible before he reaches the Infantry position. Behind the main body stands the Reserve, composed of the three arms, and in the strength of from one-fourth to one-third of the whole force. The Reserve of an Army Corps, for example, will consist of one Infantry Brigade, a Division of Cavalry, and several Batteries—the number of the latter being dependent upon the force of Artillery, which it has been already necessary to employ in the position itself.

The object of the Reserve, both at the defence and the attack,

is to have fresh troops in readiness to reinforce the action, and the necessary force for a decisive effort. It is the last resource for wresting the victory from the enemy. The commanding officer, therefore, keeps it in hand and as intact as possible for his personal disposal at the decisive moment. In the defence, this moment arrives when the enemy succeeds in carrying a part of the position, and obliging the main body to give way. The Reserve then enters the lists, and, by a vigorous counter-attack, drives back the onward-pressing foe. Another task for the Reserve consists in opposing all turning movements by the enemy, and for this the Reserve Cavalry and Horse-artillery will especially be employed.

It must not, however, be imagined, that the action of the defence is absolutely passive, *i.e.* that the defenders confine themselves to remaining stationary with the sole object of warding off the blows directed against them. On the contrary, well-directed counter-attacks, although small, are the means for offering a vigorous defence; for this, also, the Divisional Cavalry is especially adapted. This is called an active defence. The action of the Reserve, as appears from what has been already said, is in most cases, even in the defence, of an offensive character.

The retreat—should it become necessary—must be covered, when circumstances of the ground permit of it, by employing the whole force of Reserve Cavalry with the Horse-artillery. If, however, on the other hand, the ground in rear of the position is very much covered and broken, *i.e.* by woods, cultivation, villages, deep ditches, etc., an opportunity is given to the Infantry, furthest in rear, of covering the retreat by occupying the positions which such localities afford. Under circumstances of minor importance, the mere border of a wood can be used for this purpose.

The *Attack* commences with the Advanced Guard driving back the enemy's outposts. The troops then form up, from the columns of march, in order of battle, but still out of reach

of the enemy's fire, and as much concealed from view as possible. This is called the tactical formation for battle (*Aufmarsch*), as it has nothing to do with operations, but is immediately connected with the fight. The commanding officer reconnoitres the position to be attacked, so far as is possible at the distance; *i.e.* he endeavours to learn the position taken up by the enemy's troops, their strength and weaknesses, in order to make his dispositions accordingly.

In most cases the attack will be introduced by the Artillery, and prepared by the advance of company columns with numerous skirmishers, from the front body of Infantry. As soon as the preparation appears to be sufficient, the main body of Infantry moves on. As a rule, its first body of troops, developed in line, has the task of shaking the enemy by volleys, whereupon the second body of troops, remaining in columns and accompanied by skirmishers, presses upon him with the bayonet. On this occasion the Infantry will be supported by the Divisional Cavalry and Artillery, which, not unfrequently, have to move forward until within range of the enemy's Infantry fire. The fight, however, is not usually carried on in connected lines, but rather becomes separated into isolated groups, as in most cases it will revolve round strong points of the enemy's position, which are gained by bringing up fresh troops. Or they may be again lost by counter-attacks on the part of the adversary, and then by means of employing stronger forces they are carried once more, and perhaps once again lost. Thus the contest—round a village, for instance—not unfrequently fluctuates for hours before one of the opponents remains finally in possession of the object of contention.

If the attack makes no progress, the Reserve (first of all its Artillery) is brought into action. Supported by the Divisional Batteries, it succeeds in silencing the enemy's artillery by a superior fire, or at any rate in weakening it, and covers his line with shells; in short, the enemy is shaken, and the way is opened for the Reserve Infantry and Cavalry to strike the last

and decisive blow. Should this be unsuccessful, further attempts must be abandoned.

As a rule, however, the attack is not directed in the same proportions against the whole of the enemy's front. Mention has already been made of the material difficulties which in most cases have to be encountered, and which the assailant has the means of surmounting by concentrating his efforts upon one selected spot in the enemy's position. But the selection of this special point of attack is an important question. In the first instance the decision will be for the weakest spot in the enemy's line—one perhaps which presents no obstacles to an approach in front (or at any rate unimportant ones), and which cannot be efficaciously defended by Artillery. If such a spot cannot be found, the attack will then be directed upon some point which, by its elevated situation, commands the enemy's line, or upon the possession of which the maintenance of the whole position is, from other circumstances, dependent. Such a point is called the key of the position. If it falls into the power of the assailant, his opponent is obliged to give up the defence and commence the retreat. In the battle of Königgrätz, Chlum was the key of the position; and in the battle of Weissenburg, when the German arms so brilliantly opened the present war, the Geissberg had a like importance. At Sedan the plateau of Illy is another case in point.

These considerations, which influence the choice of the special point of attack, are of a tactical nature; but others also present themselves sometimes which are of a strategical character. The reader will remember that mention has already been made of the necessity, in war, of protecting the communications in rear. If, then, the line of retreat from the position lies (very unfavourably) upon an extreme flank, the strength of the attack should be directed especially against this flank, in order to oblige the foe to commence the retreat lest he should be cut off from his line of communications.

The weakest point of a line of defence, in a fighting sense, is

called the tactical point of attack ; and that which, as indicated above, is of importance for the communications in rear, is called the strategical point of attack.

Unless a direct advance against a strong position has been prescribed by a superior order, the attack may adopt the expedient of occupying the enemy in front only, and of employing the main force to turn one of his flanks ; that flank being preferred which is deficient in support. For such a manœuvre, however, a considerable numerical superiority must be disposable. Where this fails, there is danger lest a determined foe, passing on his side to the attack, may completely defeat the forces in front (in this case in weaker numbers), and place the turning detachment in a critical position.

The increased destructive power of Infantry fire, which, as already stated, is principally efficacious in the defence, makes it necessary to avoid, as much as possible, a mere frontal attack, even in the smallest combats. If a company, for example, has to cross open country in order to attack a wood or trenches occupied by the enemy's skirmishers, it will be just as necessary to consider whether a turning movement cannot be effected, as in the case of an Army Corps, under certain circumstances, with its more important problems of attack.

The direct advance upon an enemy who is in a favourable position, without taking advantage of any possible flank weaknesses, is called, in soldiers' language, 'taking the bull by the horns.'

When two adversaries come into collision, each with the intention of attacking, the fight which is then developed is called an *encounter*.

In the previous chapters, the security and intelligence services have been referred to as being important branches of field warfare. A few words upon their signification and character.

When, on account of the proximity of the enemy, the troops are unable to remain in cantonments—where they lie at a distance from one another—they are concentrated in open

camps and bivouacs. Formerly tents were carried for the camps, which, however, greatly increased the baggage of the Army, and imposed a drag upon the rapid movements which modern warfare demands; for which reasons they have necessarily been abandoned. In the French Army an arrangement has been made to replace them, by which the materials required for one small tent are carried between four men.

This explains the tidings occasionally received from the theatre of war in France of a tent encampment having been left behind by the beaten enemy. This practice, however, entails the drawback of a considerable addition of weight to the (already heavy) load carried by the men. The German soldier, in order to protect himself from the weather in bivouac, erects wind-shelters and sheds out of straw, foliage, and other suitable materials that are at hand; and, when he is to remain for some time on the same spot, he contrives to make them as habitable as possible. At the investment of Metz the hut encampments very soon attained a certain degree of comfort for the field, with the help, it is true, of articles of furniture from the neighbouring villages.

In bivouac, however, the soldier cannot always be under arms. He must procure the camp necessaries, water, forage, and fuel; he must cook and eat, perhaps also clean the arms and repair clothing; but above all, and especially after severe marches, he must—sleep, in order to recruit his strength for fresh exertions; all of which are occupations and conditions which render him unprepared for fighting; therefore security against surprise by the enemy is essential.

Although not to the same extent, yet similar precautions must be taken during the march against an enemy in the vicinity. It can be comprehended that troops cannot march for miles together through woods and villages, and across hills and valleys, formed in readiness for fighting, and therefore in a width of thousands or even only hundreds of paces, but must rather confine themselves to the roads. As, then, a large body

of troops—an Army Corps for example—occupies a depth of about 9 English miles of road, it follows that, on the sudden appearance of the enemy, some hours would be consumed in attaining the formation in order of battle. Therefore, even upon the march, troops are not completely ready for fighting, and must be secured against surprise.

In retiring before the enemy, fighting should not be engaged in unless compulsory; but the march should, on the contrary, be continued without interruption and delay. For this also precautions are necessary.

The measures for security, which are necessitated by the circumstances of war given above, consist—according to whether in camp, and therefore resting, or on the march—in outposts or advanced and rear guards.

*Outposts* therefore have to guard the camp and their comrades' rest from the enemy, who may have already shown himself, or who is expected. They are composed of about one-fifth of the whole force, and being placed under the orders of a special commander, are pushed forward to a greater or less distance according to their strength. Thus the outpost detachment of an Army Corps is placed at the least 3,000 paces—perhaps, however, about two English miles—in front of the camp. Outpost duty is taken by Infantry and Light Cavalry, their relative strength being regulated according to the country. If this is open the Cavalry of the outposts is increased; if wooded or hilly it is reduced. Artillery is only allotted to large detachments in order to render them more independent.

The first requisite in an outpost position is, that the view should be as open and extended as possible, such as, for example, is obtained from heights. As, however, the outposts have not merely to give timely information of the enemy's approach, but should also offer him some resistance, so as to give the troops in camp time to make their dispositions for defence, a position is selected (provided that it combines the main requisite given above) which has circumstances of ground

that can be defended, even though they should be but weak ones; such as a brook which cannot be immediately crossed, a line of farm buildings, or the wide-stretching border of a wood, etc.

Outposts are divided into Field Guards and their Supports. Field Guards of 20 to 30 men are placed (for reasons which are evident) by preference on the roads leading to the camp, and double sentries, *i.e.* those composed of two men, are posted some hundred paces in their front. In the Cavalry these are called Vedettes. The whole of the Field Guard posts together form the first line of observation (chain of posts), which is sufficiently compact, and is so connected that it is impossible for the smallest patrol of the enemy to pass through undetected. It is only under specially exceptional circumstances, such as perhaps the cold of winter, that Field Guards are permitted to make small camp-fires, and then only in a spot withdrawn from the enemy's view. Their rations are generally prepared by the supports, and carried to them in camp-kettles.

The duty of Field Guards, however, does not consist merely in remaining at their posts; they have likewise to patrol, *i.e.* to send out detachments to obtain information respecting the enemy. In an open country this charge is especially the business of Cavalry, whose patrols are able to go a greater distance to the front. Infantry patrols, for which Jäger are peculiarly adapted, search the enclosed country found near the front of the position. When in the immediate proximity of the enemy, this is done by means of patrols, two or three men strong, called 'creeping-patrols,' whose duty is indicated by their name. In country of a mixed character, Field Guards are composed of both arms; thus sentries and patrols are usually furnished by Infantry at night, and by Cavalry in the daytime, which latter, moreover, never unsaddle their horses for a moment.

In order to keep alive the vigilance of the posts, especially after severe marches, so-called visiting patrols are sent out at different times along the chain of posts; and in order the

better to distinguish in the dark between friend and foe, a watchword and signal are issued, the former a name, and the latter usually some external sign.

The Supports are a larger force, posted further back, who support the Field Guards when attacked by the enemy, or receive the retreating troops, according to circumstances. The stronger outpost detachments have also a Reserve, composed of all three arms, for this is the place of such Artillery as may have been assigned to them. This is called the main body of the outposts.

Posts and patrols must therefore see, hear, and procure information respecting the enemy. Fighting is not their special vocation, although it may happen that they are obliged to defend themselves. Since, however, the enemy likewise takes precautions for his own security, it is not always sufficient to see him in order to get exact information respecting him. Force may therefore also be necessary; in which case he is attacked, his posts and sentries are driven in, and a nearer view of his dispositions is obtained. For this object strong patrols, or the whole of the Field Guards with their supports—or, if necessary, even stronger detachments, composed of all three arms—are employed. The latter are furnished by the main body of the outposts, if perhaps the whole force has not engaged in the action, which brings it under the heading of a reconnaissance. As the enemy, then, also requires information on his side, the similar needs on the part of both give rise to frequent skirmishes between the outposts.

The *Advanced Guard* is usually composed of one-fourth of the whole strength, and precedes the main body of the column of march at a distance, which is likewise regulated by its strength. Thus the *Advanced Guard* of a small detachment precedes it only by some hundred paces, whilst that of a Corps, which forms the *Advanced Guard* of an army, generally keeps at a day's march in front.

An *Advanced Guard* composed of all three arms is fit for

independent action. An Army Corps usually forms its Advanced Guard of one of its Infantry Brigades, to which are allotted the Jäger Battalion, about 2 Batteries, and, according to the nature of the ground, from 1 to 2 Cavalry Regiments. The larger Advanced Guards are divided into a front troop (*Vortrupp*), main troop (*Haupttrupp*), and main body (*Gross*). In close and intersected country the Infantry is at the head; but even in this case, as a rule, it is preceded by some Cavalry, whose scouts (small parties of from two to four men) are sent well to the front in all directions—especially, however, upon the main roads, for the purpose of bringing the earliest intelligence possible of the enemy's advance. When the country is quite open, the whole of the Cavalry will perhaps be placed at the head. In order to cover the flanks of the march, patrols in greater or less strength accompany it on the sides.

The Advanced Guard forces back any small detachments of the enemy which it meets on the road. Should it encounter a stronger force it takes up a position in order of battle (making use of any advantages offered by the ground), for the purpose of covering the formation of the main body, and then either awaits the attack of the enemy, or attacks him, according to circumstances.

The *Rear Guard* of a large body of troops equally consists of all three arms, but on open ground is principally composed of Cavalry and, if any are disposable at the time, of Horse Artillery. In ground which is favourable for defence it fronts, with the view of retarding the pursuit of the enemy by obliging him to form for attack. When the object has been sufficiently attained, the Rear Guard does not engage in a stubborn defence, but rather breaks off the fight in good time and continues the retreat, in order to repeat this line of procedure on the first opportunity. In this way it secures to the main body an undisturbed retreat.

The formation of a Rear Guard is the same as that of an Advanced Guard, the arrangement, however, being inverted. Its

last division—consequently the one nearest to the enemy—is called the after-troop (*Nachtrupp*). The positions which are taken up against the pursuing enemy are called Rear Guard positions, to distinguish them from other positions which are not merely to be defended in the same transitory manner.

In war, secrecy plays a most important part. Behind the cover of his advanced troops, the general carefully conceals his strategical plans and tactical formations from the insight of the enemy ; and it follows that, on the other hand, he endeavours to learn the enemy's measures—the distribution of his forces in the theatre of war, their strength, as well as the positions they have taken up, and the march direction of his larger bodies of troops—in order to come to a conclusion as to the foe's intentions, and to decide upon his own measures. This leads us to the importance of the intelligence service. One method of obtaining information about the enemy is that of organized espionage, which is sanctioned by the law of necessity, and is met with in all wars, and equally on both sides. But the most daring spy does not always succeed in learning all that is important, or he learns it imperfectly and too late. Espionage is, therefore, an uncertain and often even a dangerous expedient. A general obtains more speedy and reliable information by the eyes of his light troops, and, if necessary, by force of arms.

It is the first duty of outposts to obtain information respecting the enemy. But when the enemy is immediately in front of them, or nearly so, their sphere is limited ; and even when this is not the case, the outposts (as such) do not send out their patrols further than from nine to fourteen English miles. If it is necessary to ascertain what the enemy is about at a greater distance, special undertakings by detached parties are necessary. These are called

*Reconnaissances.*—When it is only a matter of finding out generally how the enemy is occupied at a certain point, and if it is desirable to attain this result without fighting—for example, to obtain information of an enemy's operations solely through

observation—Cavalry patrols will be sufficient for such an object, their strength being in proportion to the distance they have to go forward. In other cases detachments, perhaps completely formed bodies of troops, are sent out; for instance, a whole Infantry Brigade, which is rendered independent by the assignment of Cavalry and Artillery. When more exact information is required as to the position and strength of a superior foe, merely coming and seeing him, and even driving in his outposts and alarming him, is seldom sufficient. In most cases it is necessary to make an attack in earnest, and thereby cause him to develop his strength. This manner of proceeding is termed a reconnaissance by force.

If the object is one which requires detachments to be sent out to reconnoitre at a distance of some days' march, and if circumstances are of such a nature that the possibility of a precipitate retreat has to be taken into consideration, then as a rule Light Cavalry only are employed, accompanied, if necessary, by Horse-artillery. Expeditions, however, of this kind assume the character of

*Inroads*, which are equally made by the Cavalry. Although the duty of procuring intelligence likewise devolves upon them, yet they are frequently employed upon altogether special enterprises, such as surprises, molesting the enemy and cutting his communications, capturing convoys of munitions and provisions, intercepting couriers, etc. It is comprehensible that such missions are, in part, combined with great risks, as they are carried out in rear of the enemy, and with the abandonment of their own direct line of retreat. They demand, therefore, adroit and agile troops and bold leaders, full of expedients and plans—officers, in short, who are peculiarly endowed for this special branch in war.

The German Light Cavalry, as previously shown, developed early in the present war in France an uncommon and profitable activity in partisan enterprises, although not always exactly for the objects given above. As an instance of this, the following

anecdote bears testimony to the spirit of enterprise existing in our Cavalry.

Soon after the commencement of hostilities on the Saar, a Prussian officer of the 7th Uhlans, with a few men of the regiment, and a number of Saarbrücken miners who were conveyed in waggons during the night to the rear of the enemy's foremost line, laid a mine in the viaduct of a railway, blew it up, and, after having successfully accomplished this *coup-de-main*, which sensibly affected the enemy, returned to his own troops without loss.

The whole class of fights by mere detachments, such as outposts, reconnaissances, and partisans, are usually designated by the common name of *petty warfare* (*kleiner Krieg*). The Russians have the advantage of possessing, as it were, a ready-formed Light Cavalry in their sons of the steppes—the Cossacks—who are especially serviceable for reconnoitring and intelligence duties, on account of their natural activity and vigilance. With the Austrians, in former times, the inhabitants of the frontier and the Croats, who were equally half children of nature, made themselves very useful as foot troops in petty warfare. The other European States have, from all time, been obliged to *educate* their troops for light service in war. But it is the German who especially shows natural talents for this service, and whose practical education in all the German Armies is preceded by a solid theoretical instruction, which not only makes the soldier conversant with the forms of all branches of the service, as learnt by rote, but invariably makes him also recognise the reason why; and it is this which causes fruit to spring from all such instruction.

The English soldier is too heavy for light service; he is, as an authority has said of him—a mere grenadier. In the Peninsular war the Anglo-Germanic (Hanoverian) legion performed this service. The French Cavalry is too bad to be able to effect much, in opposition to the excellent Light Cavalry of the German Army—in patrols and reconnaissances, for instance, as

has been sufficiently proved this year. The natural levity of the French also shows itself in their carelessness in the security service. They allow themselves to be easily surprised, especially at night. A striking example of this has been seen in the present war.

During the actions delivered by the German Meuse Army (Crown Prince of Saxony) as an introduction to the battle of Sedan, on the 30th of August, a French Division encamped before Beaumont, which had not posted a single vedette, was so completely surprised by the 4th Army Corps, that it was put to wild flight; and not only guns, numerous prisoners, and the whole camp equipage fell into our hands, but even their filled camp-kettles. And this took place in the clear light of day, and after this Division had been engaged on the previous evening, and with the enemy close at hand.

## CHAPTER IX.

## FORTRESSES.

FORTRESSES constitute an important means for the defence of a country against a hostile invasion. They serve, on the one hand, as dépôts for the secure storing of war matériel, such as guns, other arms, powder, ammunition, articles of clothing, provision magazines, etc., and, on the other hand, for strategical objects. They are the strategical points of support not only for the defence of the country, but also, if placed near the frontier, for aggressive warfare. Numerous main roads, and especially also railway and telegraph lines—means of transport and communication which become so important in war—usually concentrate in the larger fortified towns. Situated, almost without exception, on rivers and streams, the fortresses or the bridge fortifications belonging to them secure passages for their owners. They protect the retreat of a beaten army, and hinder the progress of the foe. The latter, in order to gain points of support on his side for the continuation of his advance, must occupy himself with attacking the fortified places which come in his way. Supposing, however, that he is sufficiently superior, and that the army of the country has been sufficiently weakened by its defeats to justify his venturing to set aside this consideration, and to pursue his operations further, it can be understood that, to keep up the necessary communications with his own country, in order to secure the dispatch of reinforcements or war matériel of all kinds, even of means of subsistence, he will still always be obliged to besiege (or at any rate to enclose [invest]

with sufficiently strong forces) the fortresses left behind him ; so that, in the event of their being strongly garrisoned, they may be prevented from undertaking expeditions in the open, to disturb his rear, and interrupt his communications. As, however, it is the rule that the besieger should be twice or three times as strong as the garrison, and that even for a mere investment—if this object is to be completely secured—a decided superiority is necessary ; the army of the advancing foe, operating in the field, will thus suffer a proportionably large diminution. And this advantage, which is derived from the fortresses, will last as long as their resistance endures. To return to the course of our war with France. How long did not Strasburg hold fast a whole German Siege Corps, and keep it from other employment ? Of Metz less can be said in this respect because—it is, however, a special exception—the force employed for investing the place only slightly exceeded the collective strength of the invested army.

Fortified places obtain a still greater importance, if a so-called entrenched camp is annexed to them, *i.e.* an open space covered by permanent fortifications, in which a beaten army, or one driven to it from other unfortunate circumstances, finds a secure refuge. This was the case in 1866 with the Austrian Army, when it retired to the camp at Olmütz after the day of Königgrätz ; and we have a similar example in the present war (although from a different cause), when Marshal Bazaine's Army placed itself under the protection of the detached forts round Metz.

By *permanent* fortifications must be understood those which have already been built in peace time, and which are to *remain*, in opposition to the so-called *field* (*passageren*) fortifications (entrenchments), which are constructed in the field solely for the duration of the operations, or even only for momentary objects of the fight. Fortresses, therefore, bear the character of permanent fortifications.

Smaller fortresses and permanent fortifications also serve to

protect harbours and marine establishments against an attack from the sea-side. They also acquire a strategical importance when they bar passages or mouths of rivers, as at Königstein for instance. This is especially the case, however, when railroads are within range of their guns; all use of them being then prohibited to the foe.

We have seen this year what inconvenience was caused by the many small French fortresses in the theatre of war to the advance of the German Army, from the difficulties they placed in the way of bringing up Artillery matériel, and the means of subsistence; and of what importance, for example, was the conquest of Toul at the beginning of the war for the progress of the operations upon Paris.

Fortresses are divided into three classes; in which classification, however, it is not the size only which is taken into account, but also their strategical importance, and their strength as fortifications. The North German Confederation State possesses twenty-nine fortresses; of these there are, belonging to the

First class: Königsberg, Danzig with Neufahrwasser and Weichselmünde, Magdeburg, Posen, Stettin, Rendsburg, Cologne with Deutz, Coblenz with Ehrenbreitstein, Mayence with Kastell, and the Königstein.

Second class: Kolberg, Thorn, Spandau (with the most important Prussian military establishments, such as cannon foundries, powder manufactories, etc.), Glatz, Glogau, Neisse, Erfurt, Minden, the fortifications of Jahde, Friedrichsort, Sonderburg-Duppel, Stralsund, Torgau, Wesel with Fort Büderich, and Saarlouis.

Third class: Pillau, Graudenz, Lötzen (Boyen Castle), Küstrin, Kosel, Swinemünde, Wittenberg. To these may be added some smaller fortifications, which, however, do not bear the character of fortresses. With the exception of Mayence and the rock fortress of Königstein (both of which, however, have Prussian garrisons), all these fortresses are situated upon Prussian territory.

It appears, here, quite in place to go more thoroughly into the importance of fortresses for the defence of a country ; as the dismantling of great towns, that are emporiums of commerce and industry, has become one of the questions of the day which has been recently taken up objectively by the military institutions of our country. In following up this question, amateurs in theoretical strategy, led astray chiefly by some phenomena of the last war, have raised the further question whether the military value of great fortresses bears a just proportion to the expense of their maintenance ; but, above all to the incontestably great amount of annoyance which they entail upon their inhabitants.

They are indeed so far right, that neither in the campaign of 1866 was the great military centre, Olmütz, able to arrest the march of the Prussians upon Vienna, although supported by a whole army ; nor, in the war of this year, could the equally important military centres, Strasburg and Metz (although a hostile army was likewise encamped near the latter), prevent the advance of the Germans upon Paris ; and, moreover, it is thought that our great fortresses would render us just as little good service should a disastrous war be our destiny. It does not follow, however, that what can take place in one case is always possible in all cases, and so no rule must be based upon exceptions which are produced by special circumstances.

In the year 1866, the Austrian Army was so materially and morally weakened by its numerous disasters, and finally by its complete defeat at Königgrätz, that it was obliged to retire under cover of Olmütz, and was for a time deprived of the vigour requisite for the offensive. On the Prussian side it was found sufficient to place a suitable force in position for the observation of Olmütz, in order to carry on the march to the Danube, without danger for flank or rear. In the present war with France, however, matters did not shape themselves by any means so simply. Nevertheless, the excellent generalship of the German Army (supported, moreover, by the efficiency of the

proved and victory-confident soldiers, both of the North and South), and the superiority which was soon attained over the enemy, who was weakened by battles which rapidly succeeded one another, and were always victorious—as well as by means of the development of formidable forces, especially on the part of Prussia—permitted the German Army direction to besiege Strasburg and some of the smaller fortresses; to invest Metz, with the army enclosed in it, by an impenetrable girdle of iron; and, unconcerned for the rear and communications, to proceed with the operations upon Paris through the midst of the enemy's line of fortresses. But a battle, with consequences so disastrous for the conquered as that of Königgrätz, will not soon be fought again; and as the past can furnish us with no example similar even to the unusual course taken by the present war between Germany and France, mocking all previously made human calculations, it is scarcely probable that such a course will ever be repeated in any future wars which may be Europe's destiny. Neither the Olmütz of 1866, nor the Strasburg and Metz of 1870, can be cited as condemnatory testimony in the cause of fortresses. They always have been necessary, and will always remain so.

Let us now cast a glance at Paris, *i.e.* the *fortress* Paris. Although its defence—dictated by despair as the last means of deliverance for France—was unable to change the already decisive issue of the great war still being carried on, it has nevertheless retarded its conclusion. Without its forts and ramparts the capital of France would have been in our hands some months earlier, and without doubt we should have obtained peace sooner. Moreover, if the political affairs of the country had not been so thoroughly unsettled, if her military forces had not been so completely shattered, and had her great armies been only defeated and not made prisoners by the German sword, then *fortified* Paris might still have been able to maintain the cause of France for a length of time as the great *point d'appui* of her military ardour, and—who knows?—perhaps the continuation of

resistance might not have been quite without results ; at least to the attainment of less unfavourable conditions of peace than those which the conqueror will now impose.

The desire of our large fortified towns to see themselves freed from the ramparts which confine them, circumscribing their territorial and industrial expansion, whilst at the same time exposing them to a fate similar to that which has just befallen Strasburg, is a perfectly legitimate one from their stand-point ; it may also be confidently assumed that the Government will accord it full attention. However, taking military reasons into consideration, which appear to be imperious, this cannot be accomplished by transforming them into completely open towns, but rather by razing their ramparts, etc., and substituting for them works (forts, perhaps) pushed forward to a suitable distance, and in most cases forming an entrenched camp as well. The accomplishment of these works, however, depends upon the ugly question of money.

It has also been suggested that entrenched camps, unsupported by fortified places, and consequently without involving the towns, might take the place of the large fortresses. No doubt such permanent fortifications constructed on strategically important points, would be of great significance in war ; but at the same time—apart from the fact that the dismantled towns, together with the rich resources possessed by most of them, would at once fall into the power of a victorious foe—they would not be able fully to replace the large fortresses now existing. For example, the security of passages over rivers, both for the retreat of an army and for the resumption of the offensive, would be lost by this expedient ; and even supposing that, in conformity with strategical considerations, the camps were established on the rivers, still the direction of roads and railways could not be altered accordingly. These fortified camps, if they are fully to take the place of the fortresses, would not only have to maintain a sufficient force to oppose an attack in form by a like resistance, but would also require the con-

struction of numberless military establishments, such as arsenals, provision and powder magazines, hospitals, laboratories, barracks, etc.; every thing, in fact, which already exists, if the camps were established round fortified towns. The question of expense would, therefore, be considerably increased on other grounds, if the camps were out of reach of the towns.

The passive defence of a place, so called in contradistinction to the active defence, which falls to the lot of the garrison, is formed by its works, particularly by the main rampart (main enceinte) with the main ditch in its front, by which it is surrounded; the latter is either wet or dry, according to the greater or less elevation of the place, but when dry it is in all cases revetted with masonry. The main rampart should have sufficient height to afford a survey of the country in front, and of sufficient strength to protect the town, lying behind it, as much as possible from the enemy's guns. It has salient portions—bastions—intended to be mounted with guns, in order to bombard the ground in front at an assault, and also for reciprocal defence, by flank fire, *i.e.* fire directed to the sides. It is therefore upon these bastions that the whole of the defence principally depends. Their side lines, called flanks, are usually casemated, *i.e.* furnished with masonry vaults, which are intended to give cover to the guns placed in them, and to the men who are quartered there. In the main ditch, smaller and lower works are for the most part constructed, in order to enhance the power of resistance; as, for example, the ravelin, which is intended to cover the gate of the fortress, situated between two of the bastions. In front of the ditch an embankment (the glacis) is placed, sloping gradually down to the outside level, which covers the main rampart, or at any rate its masonry substruction (the revetment-wall) from the enemy's guns. It is planted for about 100 paces with trees and bushes, the roots of which make the construction of the assailant's last works of approach more difficult. Beyond the glacis, but within range of the rampart guns, still smaller advanced works are sometimes to be found (lunettes), which

bring into the defence any specially important points of ground in front ; and also have the advantage of obliging the enemy to take them before he can attack the main rampart ; thus compelling him to begin his works at a greater distance, consequently to lose time (as at Strasburg). Large fortresses sometimes have regular advanced (detached) forts for this object, *i.e.* smaller, but closed and complete works, adapted for independent defence. These forts are even a necessity, if there are heights within range of the guns, such as those which may perhaps surround the vale of the river on which the fortress lies, and which would give the assailant the advantage of a commanding position and an insight into the works of the fortress (Coblentz, Dantzic, Metz, Paris). These heights are secured by forts, which are for the most part so strong that the enemy is obliged to make a regular attack upon them.

In ground of such a conformation, with the modern system of fortifications, the chief burden of the defence rests more upon the detached forts than upon the main ramparts. If, however, the former fall into the enemy's power, the fortress lying at a lower elevation is commanded by them, and the guns are then turned against it by the assailant. In other words, the place is then exposed to a bombardment.

Such would have been the course of affairs at Metz, if, on the Prussian side, they had not hesitated about undertaking the tedious operation of an attack upon the strong forts, with the great sacrifices it would no doubt have entailed, and preferred to confine themselves to an investment, foreseeing that the starvation of the enemy would lead to the object in a less costly manner.

Fortified places still sometimes possess *citadels*, which have descended to us from former times. These are in a manner small, but especially strong fortresses, enclosed as kernels in the great ones. They afford the garrison a secure retreat, and the possibility of continuing the defence when the place can no longer be held. The citadel of Strasburg, indeed, was so much destroyed by the German Artillery, in the course of the siege,

that it was no longer capable of defence. Besides the military object for which citadels were constructed, they also, at times, had a political one, namely to keep in check a population, inclined perhaps to revolt—a motive which, it is well known, lay at the foundation of the construction of the Parisian forts, even at a recent date. The citadels were, therefore, never placed quite outside the enceinte of the fortress, but within the line of the main rampart, so that one front was turned towards the open country, and the other towards the town, which it commanded by its guns.

A slight sketch having been laid before the reader of the progress of events in field operations, the following pages may give him an idea (naturally only a general one) of *siege operations*, *i.e.* of the defence and attack of fortified places.

On the outbreak of hostilities, the fortresses of the country situated near the theatre of war, and consequently exposed to an attack, are placed in a state of defence, *i.e.* they are armed and furnished with a suitable garrison, according to the extent of their works; including some Cavalry (one or two squadrons) and one or more so-called sortie-batteries, organized as Field-artillery, and therefore horsed. At the same time they are provisioned. The arming is conducted by the Engineer and Artillery officer of the place. It consists, in the main, in strengthening (*Sturmfreimachung*) the advanced works by palisades; placing in position the guns which have been stored in the arsenals; cutting embrasures in the parapets; transporting powder and ammunition from the peace magazine situated outside, into the war powder magazine in the interior, which is rendered bomb-proof by earth heaped upon it; organizing the service for extinguishing fires, in case of a bombardment; and finally cutting down the trees on the glacis and demolishing the buildings and garden walls which are within range of the works, in order to give free play for the working of the guns.

As long as a fortress is not actually attacked, but is

threatened, intelligence respecting the enemy's measures, especially of his approach, must be obtained by means of outposts. For this Infantry and Cavalry are chiefly employed. As soon as the attack commences, the defence principally depends upon the Artillery. It is the mission of this arm to endeavour to silence the enemy's batteries, and to prevent the construction of his works, or at any rate to impede them. This task is supported by the fire of Infantry, by whom also the works are guarded and defended, and who finally resist the attack by force (assault) upon the breach with the bayonet. In order further to hinder the enemy from establishing himself in the immediate environs of the place—or with the object of employing that important defensive measure, the destruction of his already completed works and the spiking of his siege guns—sorties are made by the Infantry in combination with Cavalry and the Artillery specially destined for this purpose; in short, every means is taken to arrest the progress of the attack.

If in spite of the efforts of all three arms, the assailants' works approach nearer, then mining operations usually begin and the engineer, with the miner also, take an active part in the defence.

It may be assumed that the reader has a general idea of what is called a mine.

This terrible means of destruction, carrying on its gloomy work below ground, invisibly and silently, is especially serviceable for the defence, and therefore in fortresses the preparations for its employment are made beforehand. As soon as the assailant's batteries reach the region of mines, *i.e.* when they arrive at the glacis, the garrison endeavours to blow up his works by means of a strong charge of powder. If the miner, by means of listening galleries, already prepared for this object, discovers that the enemy's miners are also at work, he endeavours to thwart him, digs quite silently below him or even by his side, destroys his work, and suffocates him under the earth by means of a weakly-loaded mine, the so-called 'camouflet.'

But it may, however, happen that the adversary, who is also listening, discovers in time the danger which threatens him, likewise sets to work to baffle his foe, and crushes or blows him up with a counter-mine. One can imagine the formidable character of this subterranean warfare! At the siege of Sebastopol, where mines were greatly employed, the galleries had almost entirely to be hewn out of the rock.

The defence of the breach against an assault (should it come to this) is the last act of resistance. According to the principles recognized by all civilised nations, the commandant may capitulate with honour if a thoroughly practicable breach has been made in the main rampart, and the means for its defence are no longer sufficient.

By the term breach is understood the destruction by siege guns of a certain space (about 100 feet) in the ramparts of the fortress—usually in one of its bastions; so that there no longer remains any local obstacle of importance to oppose the entrance of the storming columns.

Before a fortress is attacked, its outposts stationed outside are usually driven back, and it is invested, with the object of cutting off its communications with the country, and to prevent reinforcements of troops, war matériel, and provisions from being brought into the place. Sometimes (as, for instance, when there is no disposable siege park) this investment (blockade) of the fortress has to suffice, with a view of, at any rate, detaining the garrison and depriving it of all active participation in the war, whilst its conquest may perhaps be left to be effected by hunger. All these considerations combined were of weight in the investment of Metz. If a regular siege is to take place, it can only commence after the arrival of the siege park.

The attack of a strong fortress, sufficiently provided with forces for its defence and with a capable commandant, is one of the most difficult and tedious tasks of war. Smaller and consequently confined places, which are at the same time destitute of bomb-proof cover, may perhaps be forced to surrender by a

bombardment, of which indeed we have seen many examples in the present war. The conquest of weaker fortresses when provided with an insufficient garrison, or with one which cannot be trusted, can be attempted by a shorter road, namely (without further preliminary than a bombardment from a great distance), they may be taken simply by an assault or even by surprise; in both cases with the aid of scaling ladders. In such undertakings, however, there is no certainty of success; and, unless the foe is thoroughly incapable and negligent, they may entail fruitless losses. They are, moreover, rare exceptions in siege operations. As a rule it will be necessary to proceed to the regular attack; that is to say, to a systematic advance against the place, conformably with the principles of military science, by means of earthworks and the construction of batteries, in which course the engineer and artilleryman go hand in hand. The necessity for this can be comprehended when one considers that the whole of the ground in front for thousands of paces is commanded by the heavy guns of the fortress, so that (apart from exceptionally favourable accidents of the ground), the assailant finds no covered approach, perhaps, indeed, no hollow within 1,000 paces, in which he could conceal the smallest number of troops. If he were now, without anything further, to bring his Artillery into position for the purpose of bombarding the works of the fortress, he would have to carry on a most unequal contest with the enemy's guns, securely placed behind cover; and in a short time his Artillery would be rendered un-serviceable (dismounted). The assailant must, therefore, provide himself with artificial cover, and, taking pick and shovel in hand, must as it were *dig himself* near to the enemy—technically termed by engineers 'the approach.'

This is effected by digging out parallels (trenches), after the engineer officer conducting the attacking works has ascertained, through a reconnaissance, the most favourable section of the fortress lines for attack, and the front of attack has been determined accordingly. These trenches are from eight to ten

feet wide, and from four to five feet deep, running generally parallel with the front of attack, and exceeding it in length. The earth, which is thrown out towards the front, provides a sufficient parapet to give cover to the men posted in them, and for the transport of the guns. The different batteries which have first to reply to the fire of the place, used to be constructed either in or immediately in front of the parallels. At the present time, in consequence of the increased efficacy of modern ordnance, the batteries can be established independently of the parallels, and in most cases in rear of them.

The first parallel must be traced by the engineer as near as possible to the front of attack, although out of range of case-shot from the guns of the fortress, therefore at about 800 paces from the crest of the glacis. It is only under particularly favourable circumstances of ground—hollows offering cover, for example—that it is practicable to begin the first works nearer to the enemy's line, in which case the advantage is attained of approaching with the two parallels, and thereby economising time. The first parallel will be opened during the night, and with the greatest secrecy, so as neither to draw the attention of the enemy nor his fire to the work. If his attention has been roused he may employ light-balls in order to discover what is going on, and for the better direction of his guns.

When once the first parallel and the construction of the first batteries have given a solid foundation to the attack, the second parallel will be opened from it by means of saps; and then the third, in the same way, which will usually be constructed at the foot of the glacis; thus, the main ditch is already approached to within about 100 paces. Greater depth and width is given to this last parallel, on account of its being nearer to the enemy's works, and consequently also more exposed to inspection. It is at the same time destined to afford room and cover to the Infantry column which is formed up in it, in readiness for the assault.

The sap consists of a series of short trenches, similar to the

parallels, but leading by zig-zags in an oblique direction towards the enemy's line, and therefore progressing very gradually. The tacking of a ship working up against a head wind gives an idea of this operation.

Sapping is an especially tedious and hazardous work, for only a few sappers can be placed at the head of the sap for the purpose of throwing up the earth, who become the object of the enemy's case-shot fire. They are therefore obliged for their personal protection to push a gabion filled with earth before them. The trenches and saps must also be consolidated with gabions as they approach nearer to the enemy's line, on account of the proportionably increased efficacy of the fire directed upon the works by the artillery of the fortress. In the meantime, should the action of the attacking batteries not succeed in subduing this fire, it will be necessary to work only in the dark.

From the third parallel, the sapper establishes himself upon the crest of the glacis, by means of a more elaborate kind of sap, to describe which would take too long here. This point having been attained, the assailant gains an insight into the main ditch, and his guns can demolish the low-lying revetment-wall of the bastion selected for the assault, which has hitherto been concealed and covered by the glacis. It is now that the Artillery proceeds to construct breaching batteries and counter batteries, the latter of which have the task of silencing any of the enemy's guns which are still in action, and able to rake the trenches with grape-shot and defend the breach. The pioneers then prepare the descent into the revetted ditch, and, in the event of its being a wet one, prepare the passage across by means of fascines, or with small pontoons, or perhaps with a barrel-bridge. These bridges consist of empty barrels supporting layers of beams and planks. Everything being now so far completed, the Infantry column, standing ready in the last parallel, breaks forward to storm the breach. The mines with which the defenders may endeavour to blow up the sapping works and batteries which have come near him, are opposed by

counter-mines with which the attacking miner works forward from the third parallel.

The whole of the attacking works from the first parallel are secured from sorties, which the enemy usually undertakes in order to hinder them, by placing Infantry detachments in the trenches (the trench guard).

It may also be interesting to mention an Artillery means of attack which was employed at the siege of Strasburg—the so-called *demolition batteries*.

In its first stages, the attack upon a fortress has a superiority over the defence from being able to encircle the attacking front, and concentrate the action of its Artillery upon *one* point of it. This state of affairs, however, becomes gradually inverted as the attacking works approach nearer to the enemy's line and finally terminate in *one* point—the breaching battery—for the enemy on his side now concentrates his Infantry and Artillery fire (if the latter has not been completely silenced), upon this work. Moreover the construction of this battery, as well as of all the last works of the attack, have to be undertaken within the hazardous range of the mining system. To avoid these difficulties, and above all to gain the object by a shorter way, the assailant establishes batteries at a great distance, even in rear of the first parallel (and generally simultaneous with it), which he arms with heavy guns (possibly rifled 24-pounders), and which are intended to breach the revetment-wall lying low in the main ditch of the bastion attacked, by indirect fire, *i.e.* by fire where the object to be struck cannot be seen.

Some idea can be formed of the extraordinary precision of the Siege-artillery, if one considers that it is able to make sure of hitting and destroying an object at a distance of 1,000 paces and more, which is completely withdrawn from its view, and therefore a comparatively small object.

A means of obtaining, or at any rate of hastening, the surrender of a fortified place—which is certainly cruel, and is also ineffectual with a firm and determined commandant—is the

bombardment not merely of the works but also of the town. Recourse has been had to it in the present war, and who does not call to mind above all the bombardment of Strasburg? Naturally such a terrible expedient does not fail to give rise to the severe accusation of its being a criminal act against the laws of humanity; but wrongly so. It is the most sacred duty of every general to guard the lives of his own soldiers with the greatest possible care. In the alternative between a siege with an assault (probably entailing the sacrifice of 1,000 men or more), or the destruction of 100 houses, he *dares* not hesitate; but must, on the contrary, impose silence upon all the feelings of humanity. The law of nations condemns such conduct just as little as, on the other hand, it objects to Franctireurs, who are taken in acts of brigandage (*Banditenstreichen*), being shot down by soldiers.

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A first List of Authors and Subjects is appended; but several of the titles are provisional. The first volume, by PROFESSOR JNO. TYNDALL, F.R.S., entitled 'THE FORMS OF WATER IN RAIN AND RIVERS, ICE, AND GLACIERS,' is now in the press, and will be *published in the Autumn*. It is impossible at present to give a definite announcement of the order of publication; but it is expected that, besides Professor Tyndall's book, the following will be issued during the present year:—

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**BODILY MOTION AND CONSCIOUSNESS.**

By PROFESSOR HUXLEY, F.R.S.

**PHYSICS AND POLITICS.**

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